Key Word Sign Australia
Presenter Training 2016

Issues in Research

www.scopevic.org.au/key-word-sign-australia/
About the Presenter

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• Completed PhD in 2010
• Presenter Trainer for Key Word Sign NSW
• Over 12 years clinical experience working in area of AAC, disability and complex communication
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Overview

• Research into KWS
  – Foundational Concepts
  – A summary of the effectiveness of KWS and Gesture

• Multimodality – a basis for decision making

• A review of topical issues in KWS and Gesture
Learning Objective

• To be aware of the current evidence base supporting the use of Key Word Sign and Gesture and other AAC strategies, with people who have a disability and complex communication needs
  – Present a *general* synthesis of research findings
  – Facilitate access to a range of relevant research articles
  – Inspire interest in further reading
Research into KWS and Gesture

Foundational Concepts
Key Word Sign History

• Sign language has been used with people with intellectual disability since the 1970’s


  – Powell, G. (1999). Current research findings to support the use of signs with adults and children who have intellectual and communication difficulties. Retrieved from: [http://www.makaton.org/aboutMakaton/research](http://www.makaton.org/aboutMakaton/research)

• Shown to be effective across a range of populations and communication outcomes by many researchers since
Research Evidence

• The body of evidence investigating use of KWS&G is growing; aligned with emphasis on Evidence Based Clinical Decision Making

• Related areas of research include:
  – Typical development of speech and language
  – Typical development and use of gesture
  – Speech and language development in people who are Deaf /deaf /hearing impaired
  – Gesture development and use in people who are Deaf/deaf/ hearing impaired
  – Sign language development in people who are Deaf/ deaf/ hearing impaired
Why do sign and gesture work?

- Why does use of sign and gesture work for people with a disability and complex communication needs?
  
  - Research suggests that in people with ID visual–spatial processing of information is preferred over auditory–verbal processing; so use of sign capitalises on an area of relative strength (e.g. Broadley, MacDonald & Buckley, 1995; Remington & Clarke, 1996; Schweigert & Rowland, 1998a; 1998b; Miller et al., 1995).

  - Signs can ‘last longer’ in time than speech; can be held static as a model to encourage imitation and comprehension.

  - Visual and tactile- kinaesthetic feedback is available as the sign is produced; this is important for learning, memory and recall (Konstanteras & Leibovitz 1982; Lloyd & Doherty 1983; Kohl, 1981; Dunn 1982).
How are signs learned?

• What factors influence how a sign is learned?

1. Iconicity
2. Motivation and reinforcing value
3. Complexity of motor demands
Iconicity

- Iconicity refers to the strength of the association between the form of a symbol / sign and what it represents.
- **Transparent** – The shape, motion or function of the referent is depicted to such an extent that the meaning of the symbol can be guessed easily in the absence of the referent.
- **Translucent** – the meaning of the referent may or may not be obvious but a relationship can be perceived between the symbol and the referent.
Iconicity
“any association that an individual forms between a symbol and its referent”

‘apple’
Transparent

‘apple’
Translucent

‘apple’
Opaque
Impact of Iconicity

• Translucency of a sign influences how quickly it is acquired (Fuller & Lloyd, 1990; Romski & Sevcik, 1997)

• Iconicity is helpful when a sign is introduced to represent a word already in receptive vocabulary (In: Schlosser, Lloyd & McNaughton, 1996)

• Iconicity of signs can positively influence perceived intelligibility of speech, when speech and sign are combined (Powell & Clibbens, 1994; Clibbens, Powell & Grove, 1997)
Motivation and Reinforcing Value

• Many signs in an initial vocabulary / lexicon are chosen so that a person can make a request for a concrete object (Schlosser, Lloyd & McNaughton, 1996)

• Therefore, the reinforcing value i.e. how highly something is desired, can influence how quickly a sign is acquired (Reichle, 1991)

• If a person wants a chocolate bar, they may learn an ‘opaque’ sign for this just as easily as they learn a highly guessable sign for ‘drink’ (Reichle, 1991)
Complexity of Motor Demands

• Size of manual sign vocabulary and accuracy of sign production have been found to be highly correlated with praxis and fine motor ability (Seal & Bonvillian, 1997)

• This is a factor that needs to be considered when developing a functional vocabulary for an individual

• For individuals where motor abilities limit learning or use of signs, use of additional aided modes of AAC is suggested e.g. symbols, SGD (Mirenda, 2003)
AAC and Speech

- How does use of AAC, including sign, influence speech development?
  - Systematic review with meta-analysis

“Best level of evidence indicates that AAC interventions do not have a negative impact on speech production”

(Millar, Light & Schlosser, 2006, p. 257)
16 out of 17 participants (94%) increased speech production during or following at least one AAC intervention (Millar, Light & Schlosser, 2006)

- Of the 6 studies that met inclusion criteria, 5 described unaided (i.e. manual sign) interventions
- Modest positive effects were observed across children and adults ranging from 2 – 60 years
- Mean increase in number of words was 13 (Range = 1 – 52)
- In some cases there was a ‘lag’ before effects of AAC intervention on speech were seen
- Findings support the ‘automatic reinforcement’ theory i.e. if AAC is presented along with speech and followed by a reinforcer, both AAC use and natural speech should increase in frequency (Mirenda, 2003)
Clinical Bottom Line

Clinicians and parents should not hesitate to introduce AAC interventions to individuals with developmental disabilities whose speech does not adequately meet their communication needs.

Best available evidence suggest AAC interventions benefit development of:

- Communicative Competence
- Language Skills
- Speech Production

Parents and clinicians should be realistic about timeframes in which benefits may been seen, and not be too concerned if there is a lag of 6 – 25 sessions before gains are seen.
Research on Gesture
In typically developing children

- Different types of gesture emerge in a developmental sequence
- Gesture predicts subsequent language milestones
- Gestures and language indicate changes in symbolic operations (i.e. distancing self from object; moving from concrete to representational)
- Gestures facilitate language development
- Gestures complement spoken language
- Gestures use is associated with advances in expressive language and receptive language
- Cross modal combinations scaffold syntactical language transitions
- Gesture scaffolds conceptual development

(Capone & McGregor, 2004)
Research on Gesture
In children with language impairment

- Children with language impairment seem to benefit from the same functions that gesture serves in normal development.

- Even when development is delayed, the order or pre-linguistic and linguistic development is preserved.

- Late talkers have difficulty imitating play schemes and this may predict persistent language impairments.

- Representational gestures produced by children with specific language impairment are immature in quality; parallel the features of their language use.

(Capone & McGregor, 2004)
Research on Gesture
In people with a disability

• Gesture production is a strength for people with Down Syndrome, relative to other language skills

• Children with Down Syndrome are shown to have considerably larger repertoires of gesture than matched peers

• Gesture is a clinically useful scaffold for children with Down Syndrome (Capone & McGregor, 2004)

• Parent’s translations of gestures has been shown to facilitate word learning in children with disability and also in typically developing children (Dimitrova, N., Özçalışkan, Ş. & Adamson, 2016)
Research on Gesture
In people with a disability

- The gesture development of children with autism is different to that of typically developing children.

- Difficulties with pointing due to the social-emotional load associated with it.

- Like other children with language impairment though, children with autism can use transparent/translucent gestures to augment their communication during conversations.

- Instruction in manual modality may be a useful clinical and education strategy, although synchronous vs asynchronous presentation of information in visual /auditory modes is a consideration.

(Capone & McGregor, 2004)
Research into KWS&G

• Research shows that children progressively give up the use of sign and gesture as their oral language expands.

• This applies to:

  – Gesture
    • in typically developing children (Liszkowski, 2008; Capone & McGregor, 2004)

  – Sign
    • Down Syndrome (Galeote et al. 2011)
    • Intellectual Disability / Developmental Disability (Vandereet et al. 2011)
    • Children identified at risk (McGregor, 2008)
Research into KWS&G

• Clinical Bottom Line

Gesture enhances, not hinders, language development.

Gesture provides children a means of communicating when the spoken modality is not fully developed.

Parents and caregivers often need training to recognise and accept gestural communication. When gestures are ‘translated’ into words by parents, this aids vocabulary development.

Experimental research that demonstrates the effectiveness of gesture use in treatment is lacking, as is prognostic and diagnostic research.
Research into KWS and Gesture

A summary of the effectiveness of KWS and gesture
A model of Evidence Based Practice

Model of Transdisiplinary Evidence Based Practice
(Adapted: Satterfield et al., 2009)

Clinical Decision Making

Best available research evidence

Client and family values and preferences

Clinician experience and expertise

Environmental & Organisational Context
Research Questions and Designs

• There are many ways to consider the research literature on KWS and gesture

• We could ask:
  – How is the use of sign assessed?
  – How does use of sign influence communication development?
  – What is the profile of people with a disability who use sign?
  – What do clients and families say about their experience of using sign?
  – What is the economic impact of using sign compared to other methods of AAC?
  – Why do some individuals prefer use of sign over other AAC modalities?
A focus on Intervention Research

• Ultimately though, we are interested in knowing whether use of KWS and gesture is an effective intervention strategy to enhance communication outcomes for people living with a communication disability i.e. Does it work? Should we use it? How should we use it?

• More specifically, we may want to know whether KWS is more or less effective than another form of AAC, for a certain individual or population, or an outcome of interest

• Therefore, we need to look at the *empirical* published literature, that has focussed on the use of KWS as an intervention strategy
Research Design and Methodological Quality

• There are many different types of research designs used in intervention research e.g. Systematic Reviews, Randomized Controlled Trials, Comparative Studies, Case Series, Case Studies

• Whether or not a piece of research is ‘good quality’ and ‘trustworthy’ depends on:
  – Type of research design and the corresponding Level of Evidence
  – How well the study has been carried out or its Methodological Quality
Levels of Evidence

Level of Evidence in Research

High Level of Control

- Sys Reviews-Metaanalysis
- RCT’s
- Cohort studies
- Case-Control
- Cross-sectional studies
- Case series, Case reports
- Ideas, opinions, editorials, anecdotal

Low level of Control
Research into KWS&G
1 – Use of sign with people with ID

In people with Intellectual Disability what effect does use of key word sign and gesture have on communication outcomes?

<table>
<thead>
<tr>
<th>Population (P)</th>
<th>Intervention (I)</th>
<th>Comparison (C)</th>
<th>Outcome (O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual Disability OR Learning Disability OR Cognitive Impairment OR Mental Retardation OR Developmental Disability</td>
<td>Key Word Sign OR KWS OR Gesture OR Manual Sign OR Sign language OR Sign Systems OR Makatoni OR Total Communication</td>
<td>Nil</td>
<td>Speech OR Expressive language OR Receptive Language OR Interaction OR Communication OR Social</td>
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</table>
State of the evidence

• High number of cross-sectional exploratory or descriptive studies (e.g. Vandereet et al., 2011)

• Limited number of experimental studies (intervention studies) (e.g. Van der Meer et al., 2012)

• Small numbers of participants

• Inclusion of multiple aetiologies under the heading ‘intellectual disability’ or ‘developmental disability’ (e.g. Autism, Down Syndrome, Williams Syndrome, Fragile X Syndrome)
Clinical Bottom Line

Individuals with intellectual disability / developmental disability can be taught to use various AAC options to enhance communication outcomes.

Speech Generating Device; Picture Exchange Communication Systems; Aided Symbol Systems; Manual Sign

Individuals often demonstrate a preference for one communication mode over another and this is a current research focus.

Outcomes are influenced by individual attributes (cognitive, communicative, vocabulary comprehension) and socio-environmental factors.

High quality, high level evidence is currently limited.
Representative Literature


# Research into KWS&G
## 2 – Use of sign with people with Down Syndrome

In people with Down syndrome what effect does use of key word sign and gesture have on communication outcomes?

<table>
<thead>
<tr>
<th>Population (P)</th>
<th>Intervention (I)</th>
<th>Comparison (C)</th>
<th>Outcome (O)</th>
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</thead>
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<tr>
<td>Down Syndrome OR Trisomy 21</td>
<td>Key Word Sign OR KWS OR Gesture OR Manual Sign OR Sign language OR Sign Systems OR Makaton OR Total Communication</td>
<td>Nil</td>
<td>Speech OR Expressive language OR Receptive Language OR Interaction OR Communication OR Social OR Conversation</td>
</tr>
</tbody>
</table>
Receptive comprehension is a relative strength of children with Down Syndrome. Gestural production is also an area of strength.

There is a contradiction in the current literature with some studies showing that there is no disassociation between linguistic development and cognitive development of children with Down Syndrome (e.g. Galeote et al., 2011); whilst other studies suggest that lexical development does lag behind cognitive development (e.g. Zampini & D’Odorico, 2013)

Similar to typically developing children, in children with Down Syndrome gestures serve as a ‘bridge’ between word comprehension and word production; and early gesture use, in association with comprehension, predicts vocabulary development
Assessment of symbolic comprehension shows that children with Down Syndrome find gestures significantly easier to understand than miniatures or substitute objects used as abstract symbols to represent other objects, thus supporting use of sign and gesture as a modality for communication input.

As the oral vocabulary of children with Down Syndrome expands, they progressively give up use of gesture and sign.

Use of sign (expressive and receptive) in the early stages of language development can help to improve initial communication and reduce frustration.

There are significant methodological considerations that need to be taken into account when comparing the outcomes of studies including: size of sample, nature of assessment and outcome measurement, statistical analysis and reporting.
Representative Literature


Research into KWS&G
3 – Use of sign with people with Autism Spectrum Disorders

In people with autism spectrum disorders what effect does use of key word sign and gesture have on communication outcomes?

<table>
<thead>
<tr>
<th>Population (P)</th>
<th>Intervention (I)</th>
<th>Comparison (C)</th>
<th>Outcome (O)</th>
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</thead>
<tbody>
<tr>
<td>Autism OR Autism Spectrum Disorder OR ASD OR Asperger’s Syndrome OR Developmental Disability</td>
<td>Key Word Sign OR KWS OR Gesture OR Manual Sign OR Sign language OR Sign Systems OR Makaton OR Total Communication</td>
<td>Nil</td>
<td>Speech OR Expressive language OR Receptive Language OR Interaction OR Communication OR Social OR Conversation</td>
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</table>
Clinical Bottom Line

Sign is considered an ‘Emerging’ evidence based intervention for people with autism spectrum disorder

Use of gesture to support imitation based training methods and receptive language instruction may be helpful

Studies show that gesture and speech are not always effectively integrated during social communication in people with autism - consider sequential rather than simultaneous presentation of speech and gesture / sign

Children with autism use significantly less gesture in early development than TD peers or those with other types of DD – this has implications for early autism screening, assessment and intervention
Clinical Bottom Line

Using signs can provide effective communication options for students with autism

Signing does not impact negatively on speech production and generally has a positive though modest impact on speech production

It is becoming clear that individual differences among children with autism may mean a preference for, and greater success with, one type of communication compared with another and individual differences should be taken into account when choosing and designing communication systems. This is consistent with a multimodal and individualised approach to communication.
Representative Literature


Representative Literature (cont…)


Representative Literature (cont…)


Research into KWS&G
4 – Use of sign with people with Physical Disability

In people with physical disability such as cerebral palsy what effect does use of key word sign and gesture have on communication outcomes?

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<th>Population (P)</th>
<th>Intervention (I)</th>
<th>Comparison (C)</th>
<th>Outcome (O)</th>
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<tr>
<td>Physical Disability OR Cerebral Palsy OR Motor Impairment OR Mobility Impairment</td>
<td>Key Word Sign OR KWS OR Gesture OR Manual Sign OR Sign language OR Sign Systems OR Makaton OR Total Communication</td>
<td>Nil</td>
<td>Speech OR Expressive language OR Receptive Language OR Interaction OR Communication OR Social OR Conversation</td>
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Clinical Bottom Line

Early studies unable to demonstrate any benefit of the use of manual sign in people with cerebral palsy when compared to other form of AAC e.g. symbols, SGD’s

Ability to use and preference for different forms of AAC vary greatly across individuals and therefore functional, ecological assessment of communication needs, including communication partners, is essential

Multimodal communication is common in people with cerebral palsy

Use of aided and unaided speech supplementation cues can improve perceived intelligibility of dysarthric speech in people with gross motor impairment
Representative Literature


Multimodality

A basis for decision making

Multimodal Communication

“EVERYTHING an individual uses to communicate or enhance communication. Different strategies may be needed for different situations and communication partners. Strategies and tools may be combined to meet a wide variety of communication functions”

(The Bridge School, 2010; retrieved from https://bridgeschool.org/transition/multimodal/index.php)
From ASHA

“AAC incorporates the individual’s **full communication abilities** and may include any existing speech or vocalizations, gestures, manual signs, and aided communication.

AAC is truly multimodal, permitting individuals to use **every mode possible to communicate**

"Providing multimodal communication means offering a range of communication systems and strategies as options to enable the person the greatest degree of choice in using a preferred modality in any given situation…. It is recognised within the AAC field that no-one method or technique will fulfil every communication need in every situation”.

(SPA, 2012; p. 9)
Multimodality –
A multidimensional concept

Multimodal
Communication

Modalities
Modes
Methods & Techniques

AAC SYSTEM
Communication Modalities

Visual

Auditory

Kinaesthetic
Communication Modes

Visual
- Gesture
- Body language
- Eye gaze / facial expression
- Manual sign or sign approximations
- Sign language
- Pictures
- Writing / Reading

Auditory
- Speaking / Listening
- Vocalisation
Communication Methods

- Speech
- Gesture
- Mime
- Key Word Sign
- Auslan
- Objects
- Object symbols
- Tactile symbols
- Activity schedule

- Alphabet boards
- Chat books
- Communication book/board
- Theme/topic board
- Community request cards
- Speech Generating Devices
- Mobile technologies

PLUS!
Instructional techniques to support learning and implementation
AAC System

“An integrated group of components, including the symbols, aids, strategies and techniques used by individuals to enhance communication.

The AAC system serves to supplement any gestural, spoken and/or written communication abilities”

(ASHA, 1991; SPA, 2012)
International Classification of Functioning, Disability and Health (WHO, 2001)

http://www.who.int/classifications/icf/training/icfbeginnersguide.pdf
ICF-CY and CSI - CY


AND...

## RESTRICTIONS IN PARTICIPATION CAUSED BY COMMUNICATION LIMITATIONS

<table>
<thead>
<tr>
<th>SCHOOL RELATED ACTIVITIES</th>
<th>Don't Know</th>
<th>Not Applicable</th>
<th>Greater than Typical Peer</th>
<th>No Restriction</th>
<th>Mild Restriction</th>
<th>Moderate Restriction</th>
<th>Severe Restriction</th>
<th>Complete Restriction</th>
<th>PRIORITIZE for INSTRUCTION</th>
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<tbody>
<tr>
<td>1. Playing with others as an educational activity</td>
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<td>2. Classroom activities (e.g., attending classes and interacting appropriately to fulfill the duties of being a student)</td>
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<td>3. Communal activities (classroom games, assemblies, eating in the cafeteria, field trips)</td>
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<td>4. Recreation (physical education, recess, playground games)</td>
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<td>5. Creative activities (art classes, orchestra/band, chorus)</td>
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<td>6. Civic activities (school paper, student government, school club, serving as student aid, safety patrol member)</td>
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<td>7. Other academic activities (computer labs, science labs, library use, gifted/talented classes)</td>
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<td>8. Social activities (school dances, pep rallies, hanging out with friends at school)</td>
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<td>9. Social independence activities (driver's ed., home economics/shop, after school organized sports)</td>
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<td>10. Vocational training (community work experience, community college, community based recreation)</td>
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<td>11. Transition planning (independent living skills practicum, transportation training)</td>
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<td>12. Looking after one's safety at school (avoiding risks that can lead to injury or harm)</td>
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<td>13. Maintaining one's health (caring for oneself by being aware of and doing what is required for one's health)</td>
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<td>14. Other school related activities? (describe)</td>
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Participation Model

- Assess potential to increase natural ability
- Assess potential to utilise AAC systems/devices
- Natural ability interventions
- AAC system/device interventions

Communicative Competence

- Knowing one’s native language
- Knowing the codes of one’s AAC system

- Technical skills needed to operate AAC system (which may consist of multiple aids)

Linguistic Competence

Operational Competence

- Managing use of AAC in functional situations

Strategic Competence

Social Competence

- Skills needed for managing social, communicative interactions

Light (1989); Light, Arnold & Clark (2003); Light, Roberts, DiMarco & Greiner (1998); Light & Beukelman (2014).
Topical Issues in KWS and Gesture
1. Baby Sign

• Involves teaching sign to typically developing babies

• Based on research that babies learning sign as a first language produce their first signs slightly earlier than babies produce their first spoken words i.e. the theory is that use of sign will enhance or accelerate language development

• Increasingly popular in recent years

• Is still a controversial topic
Clinical Bottom Line

First randomized controlled trial (Kirk et al, 2012) showed that encouraging symbolic gesture (baby sign) in typically developing infants had no significant effect on language outcomes and did not accelerate linguistic development.

Mothers who use gesture in their interactions with their babies were more responsive to their infants’ nonverbal cues and encouraged more independent action by their infant.

Questionable effect of baby sign as an intervention for language acceleration, HOWEVER gesture has been shown to be an early marker of which children with early unilateral lesions (brain damage) would eventually experience language delay, suggesting that gesture is a promising diagnostic tool for persistent delay i.e. Prognostic.
Mothers who are taught to use infant sign continue to use more signs with their infants than those in a control group.

Mothers using sign with their children are more attuned to changes in children’s affect and more responsive to children’s distress cues.

Mothers using sign viewed their children more positively, reducing parenting-related stress.

There is emerging evidence that a simple infant sign intervention is an effective tool to promote bidirectional communication and positive interactions for preverbal children and their parents.
Representative Literature


Representative Literature (cont…)


Representative Literature (cont…)


2. Creating a Sign Environment

- A good language environment requires language models (Von Tetzchner, 2000)

- Consistent signing from partners (Spragale & Micucci, 1990)

- Functional vocabulary (Loeding et al., 1990)

- “Sign teaching needs to be embedded in a creative approach to communication which encourages peer interaction and incorporates functional goals.” (Grove & McDougall, 1991)

- Parallel with aided language stimulation (ALS) approaches (Bloom & Treloar, 1997; Goossens, Crain & Elder, 1992)
Clinical Bottom Line

People with disabilities sign more when communication partners sign to them and respond to sign attempts.

To facilitate ongoing use and development of sign the communication partner needs to know at least as many if not more signs than the person they are communicating with (modelling and teaching).

In an organisational setting, the following factors contribute to establishing a signing environment:

- Support from management;
- Provision of training in a way that gives knowledge, practice and support in 'real' situations;
- Development of centre-wide policies on signing and communication;
- Involvement of all members of staff in determining their needs and the direction of the project;
- Addressing the staffs underlying beliefs and attitudes in order to change their signing behaviour;
- Flexibility in the signing system.
3. Efficacy of Key Word Sign Workshops

- How best to facilitate learning, retention and use of KWS and gesture in non-signing communication partners?

- Attendees may be managers, staff, family members, teachers, community members, health professionals

- Highly variable levels of knowledge, skill, awareness, experience, attitudes, and motivation prior to attending
Clinical Bottom Line

Majority of workshop participants are highly enthusiastic about workshops; participation rates are high

Participants in KWS workshops show a significant difference in recognition and production of signs per and post workshop; gains are not maintained beyond 6 weeks

Staff who have received training in KWS use significantly more sign than untrained staff

While use of sign and gesture significantly changes following a formal training, accompanying change in use of language, MLU, pragmatic functions is not seen in communication partners
Clinical Bottom Line

A critically appraised topic (CAT) completed by the NSW AAC EBP Group in 2012, found the following features of training to communication partners to facilitate communication in AAC users:

- A series of half day direct training sessions
- Use of video illustrating using AAC
- Use of video feedback to communication partners
- Analysis of videoed interaction by trainees
- Visual aids (e.g. cards showing KWS)
- Person Centred training
- Action Planning/ Goal Setting
- Training on making AAC resources
- Instruction within the Natural Environment
- Coaching methods-e.g. demonstration and feedback
- Individual and small group training

Clinical Bottom Line

- Formal training that includes a greater number of training components (i.e. modelling/verbal feedback + video feedback + photo reminder) leads to greater accuracy in sign production over the long term (7 months) (Rombouts et al., 2016)

- Further research is required into the effect of rehearsal strategies in conjunction with feedback modalities on retention of signs and accuracy of production
Representative Literature


Current and future research ideas

• Tele-health and tele-education models of training and delivery of therapy

• Blended learning and the role of mobile technologies

• Lived experience of learning and using key word sign (individuals, parents, families, communities)

• Social validation of Australian key word sign vocabulary
Where to from here?

• What research are you interested in reading more about?

• What research questions can you identify that remain unanswered?

• What research questions could you be involved in answering?
Questions and Comments